in this region is sharply separable from the cerebro-spinal, and there is no evidence that the facial ganglion is in process of transformation into a sympathetic ganglion. In Amiurus the geniculate is much larger and crowded still more closely up to the Gasserian. It can however be clearly shown that the r. lateralis accessorius in both Gadus and Amiurus is composed mainly of communis fibers and receives no fibers from the Gasserian ganglion.

From these results, and those of Strong, Kingsbury and others, it appears that the peripheral nervous system of Menidia presents us with a paradigm applicable in the broad view to the Ichthyopsida as a whole.

*The Teleost gastrula and its modifications:* F. B. SUMNER.

The prevailing view that the germ-ring alone furnishes the mesoderm and the entoderm must be revised, as well as the view that in teleosts, the periphery of the plastoderm represents the whole blastopore.

A specialized portion of the blastopore occurs at the posterior end of the embryonic shield a little anterior to the margin. In *Murœna* and probably some other fishes, this takes the form of an open invagination of the 'Deckschicht.' The cell thus invaginated becomes the gut hypoblast. The cavity persists for a while as that of Kupffer's vesicle. Thus Kupffer's original account, written in 1868, was very near the truth, although ignored or rejected by most of his successors.

In the cat-fish, trout and some others this blind sac is replaced by a solid ingrowth, such as Kowalewski described for the goldfish. Kupffer's vesicle is formed in this mass of cells which, in the trout, at least, probably furnishes the whole gut epithelium.

In the case of *Scorpœna* and probably many other pelagic fish eggs, this reduction has still further progressed, and we find at the posterior middle point of the blastoderm a small nodule of cells, causing a thickening of the 'Deckschicht.'

The present writer finds a condition in *Amia* quite comparable to that in *Murœna.* Although the egg of the former is holoblastic, its gastrula is very like that of the Teleosts and far different from that of the Amphibia. Dean has already pointed out in *Amia* the homologue of Kupffer's vesicle. The present writer also finds a rudimentary syncytium or periblast with giant nuclei.

*On the embryology and phylogeny of Chimœra:* BASHFORD DEAN.

The embryology of a chimæroid throws interesting light on the relations of this doubtful group. By this means the characteristic structures of Holocephali are shown to have arisen from distinctly Selachian conditions: the palato-quadrate in *Chimœra colliei* is thus early separate from the cranium: the frontal clasper is to be regarded as the homologue of a spine of first dorsal fin, which in ontogeny, owing to the precocious growth of the enormous eyes, shifts into its anterior position: the dental plates arise from separate anlagen, which in general are in the adult represented by the tritoral areas.

*C. colliei* spawns near Monterey, California, throughout the entire year, in deeper water (about 75 fathoms, sp. gr. 1.027, 55° F.). It deposits two eggs almost simultaneously. First cleavage about 26 hours after egg is deposited: early cleavages separated by intervals of from 3 to 6 hours. The young escapes from the egg-case in about 250 days. Polyspermy occurs. Blastula and gastrula distinctly shark-like. Early embryo with broad medullary folds. After closure of folds embryo differentiates as chimæroid. Eye increases enormously in size, altering the shape of the head, and accompanies ventral displacement and ob-

literation of the spiracle, and the fusion of the palato-quadrate with the cranium. Dermal margin of the hyoidean arch develops early and partly encloses the hinder gill slits. Long external gill-filaments (arising as in shark from the posterior margin of the gill bar) are now present. Tail becomes exceedingly long and attenuated. A highly specialized character is the mode of absorption of yolk material during late embryonic stages. The extra-embryonic blastoderm surrounds a lobe of the yolk: the latter comes to be reduced to independent lobes, and later to a milky fluid which is doubtless appropriated by the embryo by means of its external gills. These now present greatly dilated blood nodes, red in color. The late embryo lies in an opaque nutritive fluid, its relatively small and irregularly shaped yolk sac represents the small lobe early separated from the yolk.

*On the occurrence of amphioxus at Bermuda:* C. L. BRISTOL and F. W. CARPENTER.

Amphioxus was first found in Bermuda by Professor G. Brown Goode in 1877, but no specimens have ever been studied from the lot then collected. In the season of 1897, the Second New York University Expedition dredged for them unsuccessfully, but in the next season specimens were secured by Professor Verrill in April, and again in June by the Third New York University Expedition at the locality described by Goode at the Flatts Bridge. In addition to this locality, the New York University party found them near Trunk Island in Harrington Sound. Specimens were sent to Professor E. A. Andrews, who reports that they promise to prove *Branchiostoma caribaeum.*

*Budding in Cassiopea:* R. P. BIGELOW.

In the course of an extended study of the development of *Cassiopea xaymacana*, a rhizostomatous medusa obtained in Jamaica, the author found it possible to draw an interesting comparison between the process of budding and strobilization. The buds are formed one at a time on the lower part of the calyx of the scyphistoma. The bud is an evagination of the body wall consisting of three layers—ectoderm, mesoglœa, and endoderm; and in the mesoglœa are embedded four longitudinal muscles which are formed by outgrowths from the adjacent longitudinal muscles of the present.

In the formation of the strobila, the greater part of the scyphistoma is converted into the medusa disc, while the basal polyp is a comparatively small and simple appendage serving mainly for support. This, like the bud, consists of a simple sack with a wall of three layers—ectoderm, mesoglœa and endoderm, and in the mesoglœa there are four longitudinal muscles. Just before the separation of the medusa the basal polyp forms eight tentacles, and a ridge of ectoderm grows out in a circle surrounding the isthmus. When medusa is set free, this ridge enlarges to form a proboscis, more tentacles are developed, and very soon the basal polyp cannot be distinguished from an ordinary scyphistoma developed from a bud.

Before the bud is set free its proximal and distal ends become differentiated structurally, so that it is easy to distinguish them. Soon after becoming free the planula-like bud becomes attached to some solid support by its distal end, and the mouth is formed at the proximal end and becomes surrounded with a crown of tentacles, the orientation is just the opposite of what one would expect and corresponds with what Claus and Goette found to occur in Cotylorhiza.

So the bud and the basal polyp not only correspond in general structure, but in both it is the proximal end that forms the mouth and the distal end the foot. Their orientation is the same, and while attached to the calyx, their central axes meet as an acute